What is claimed is:

1. A defects inspecting apparatus, comprising:

a scanning stage for running into a predetermined direction while mounting an inspection target substrate thereon;

an illumination optic system for irradiating an illumination light beam upon a surface of said inspection target substrate at a predetermined angle inclined thereto;

a detection optic system including, an upper-directed detection optic system, having an objection lens for condensing upper-directed reflected/diffracted lights reflected and/or diffracted upwards from said inspection target substrate, an upper-directed image-forming optic system for forming an image of the upper-directed reflected/diffracted lights condensed through said objection lens, and an upper-directed photo-detector for receiving the image of the upper-directed reflected/diffracted lights, which is formed through said upper-directed image-forming optic system, and thereby converting into an upper-directed image signal, and a side-directed detection optic system, having a side-directed image-forming optic system for forming an image through condensing side-directed reflected/diffracted lights emitted from said inspection target substrate into a direction inclined so as to flatly intersect said illumination light beam, and a side-directed photo-detector for receiving an image of the side-directed reflected/diffracted lights, which is formed through said side-directed image-forming optic system;

an A/D converter for converting the upper-directed image signal obtained from the upper-directed photo-detector of said detection optic system into an upper-directed digital image signal, and for converting the side-directed image signal obtained from said side-directed photo-detector into a side-directed digital image signal; and

a signal processing system for detecting defects upon basis of each of the digital signals converted within said A/D converter.

2. The defects inspecting apparatus, as defined in the claim 1, wherein said illumination light beams are made in plural numbers thereof, and each of the illumination light beam is irradiated into directions, flatly differing from each other to said inspection target substrate.

3. The defects inspecting apparatus, as defined in the claim 1, wherein said illumination light beam is a laser light beam emitted from a laser light source.

4. The defects inspecting apparatus, as defined in the claim 1, wherein said illumination light beam is made to be a slit-like beam of lights in about parallel with a longitudinal direction thereof, as an illumination condition upon said inspection target substrate, and nearly normal to the running direction of said scanning stage in the longitudinal direction thereof, within said illumination optic system.

5. The defects inspecting apparatus, as defined in the claim 1, wherein the upper-directed detection optic system of said detection optic system has a space filter for shielding at least repetitive lights of circuit patterns lying on the inspection target substrate, and repetitive light shielding pattern of the space filter can be set up, automatically, in sizes and configurations thereof.

6. The defects inspecting apparatus, as defined in the claim 1, wherein a magnifying power of said image-forming optic system is variable, within the upper-directed detection optic system of said detection optic system.

7. The defects inspecting apparatus, as defined in the claim 5, wherein a magnifying power of said image-forming optic system is variable, within the upper-directed detection optic system of said detection optic system.

8. The defects inspecting apparatus, as defined in the claim 1, wherein said upper-directed detector is constructed with a TDI image sensor, within the upper-directed detection optic system of said detection optic system.

9. The defects inspecting apparatus, as defined in the claim 5, wherein said upper-directed detector is constructed with a TDI image sensor, within the upper-directed detection optic system of said detection optic system.

10. The defects inspecting apparatus, as defined in the claim 1, wherein said upper-directed digital image signal is merged by vicinity pixels, and detection is made upon the defects upon basis of said image signal merged, within said signal processing system.

11. The defects inspecting apparatus, as defined in the claim 1, wherein said signal processing system further comprises a classifying means for classifying said defects detected into different categories.

12. The defects inspecting apparatus, as defined in the claim 8, wherein said signal processing system further comprises a classifying means for classifying said defects detected into different categories.

13. The defects inspecting apparatus, as defined in the claim 1, wherein said signal processing system further comprises a size measuring means for measuring sizes of said defects detected.

14. The defects inspecting apparatus, as defined in the claim 8, wherein said signal processing system further comprises a size measuring means for measuring sizes of said defects detected.

15. The defects inspecting apparatus, as defined in the claim 1, further comprising an optical microscope for observing an optical image upon said inspection target.

16. The defects inspecting apparatus, as defined in the

claim 1, wherein an area or a mark indicative of coordinates of the defects detected by said signal processing system upon a screen observed on said optical microscope.

17. The defects inspecting apparatus, as defined in the claim 1, wherein said illumination light beam is exchangeable between a high-inclination angle and a low-inclination angle with respect to the surface of said inspection target substrate within said illumination optic system; and further comprising:

a signal processing system, having a defects detection processing portion for detecting the defects upon basis of the digital image signals, which are converted within said A/D converter portion when illumination is made at the high-inclination angle and at the low-inclination angle within said illumination optic system, a characteristic-quantity calculator portion for calculating characteristic quantities, about the defects detected from said defects detection processor portion, and an integration processor portion for obtaining the characteristic quantities about the defects, on which coincidence can be considered between the defects detected from said defects detection processor portion when the illumination is made at the high-inclination angle and the defects detected from said defects detection processor portion when the illumination is made at the low-inclination angle, and for classifying the category of the defects upon basis of said characteristic quantities obtained.

18. The defects inspecting apparatus, as defined in the claim 17, wherein the characteristic quantities about said defects are made up with a detection-light amount and a flat area.

19. The defects inspecting apparatus, as defined in the claim 1, wherein said signal processing system has a classifying means for classifying the category of the defects, from the each digital image signal, which is converted in said A/D converter.

20. A defects inspecting apparatus, comprising:

a scanning stage for running into a predetermined direction while mounting an inspection target substrate thereon;

an illumination optic system for irradiating an illumination spot upon a surface of said inspection target substrate, scanning it into a direction perpendicular to the running direction of said scanning stage;

a detecting optic system, having an image-forming optic system for condensing reflected/scattered lights, which are generated from said inspection target substrate due to scanning of the illumination spot irradiated within said illumination optic system, and for forming an image thereof, plural numbers of optical fibers receiving lights of the image of reflected/scattered lights, which is formed said image-forming optic system due to scanning of the illumination spot, and thereby for guiding, and photomultiplier tubes receiving an optical image due to the scanning of the illumination spot, guided by said plural numbers of optical fibers, and for converting it into a signal; and

a signal processing system for converting the signal obtained from each of said photomultiplier tubes into a digital signal, and for detecting defects upon basis of said digital signal converted.

21. A defects inspecting apparatus, comprising:

a scanning stage for running into a predetermined direction while mounting an inspection target substrate thereon;

an illumination optic system, having plural numbers of optical modulators for modulating each of plural number of illumination light beams by frequencies, differing from each other, an optical deflector for deflecting the plural numbers of illumination light beams, which are modulate through said plural numbers of optical modulators, into a direction about normal to the running direction of said scanning stage, and a condenser optic system for condensing the plural numbers of illumination light

beams, which are deflected by said deflector, upon a surface of said inspection target substrate in a form of plural numbers of illumination spots, thereby for irradiating;

a detecting optic system, having an image-forming optic system for condensing reflected/scattered lights, which are generated from said inspection target substrate due to scanning of the plural numbers of illumination spot irradiated within said illumination optic system, and for forming an image thereof, a photo-detector for receiving lights of the image of reflected/scattered lights, which is formed said image-forming optic system due to scanning of the plural numbers of illumination spots, and for converting it into a signal; and

a signal processing system, having plural numbers of synchronization detection circuits for extracting components corresponding to frequencies, each being modulated in each of said optical modulators, from the signal converted within the photo-detector of said detection optic system, and for detecting defects upon basis of signals extracted from said plural numbers of synchronization detection circuits.

22. The defects inspecting apparatus, as defined in the claim 21, wherein said illumination optic system has a branching optic system for forming illumination light beams in plural numbers thereof.

23. The defects inspecting apparatus, as defined in the claim 21, wherein said photo-detector comprises optical fibers for guiding the image of reflected/scattered lights due to the scanning of the plural numbers of illumination spots received thereupon, and photomultiplier tubes, receiving the optical image due to the scanning of the plural numbers of illumination spots, which are guided through said optical fibers, and for converting it into a signal.

24. A defects inspecting method, comprising the followings

steps of:

a first step for irradiating an illumination light beam upon a surface of an inspection target substrate, having circuit patterns thereon, by an illumination optic system, condensing reflected/scattered lights generated from said inspection target substrate irradiated through an objection lens, so as to form an image thereof through an image-forming system, receiving the reflected/scattered lights upon an upper-directed photo-detector, so as to convert into a first image signal, and thereby detecting defects lying on the surface of said inspection target, having the circuit patters thereon, upon basis of said first digital image signal converted; and

a second step for irradiating illumination light beam upon a surface of a transparent film on the inspection target substrate through said illumination optic system at a predetermined inclination angle thereto, condensing reflected/scattered lights generated from said inspection target substrate irradiated from a direction inclined so as to flatly intersect said illumination direction, by means of the image-forming optic system so as to form an image thereof, receiving said reflected/scattered lights forming the image thereof upon a photo-detector, so as to convert it into a second image signal, and thereby detecting defects lying on the surface of the transparent film on said inspection target substrate upon basis of said second digital image signal converted.

25. The defects inspecting method, as defined in the claim 24, wherein upon the surface of the inspection target substrate is irradiated a slit-like beam having a longitudinal extending into a direction about normal to the running direction of said inspection target substrate.

26. A defects inspecting method, comprising the followings steps of:

an illumination step for condensing and irradiating plural

numbers of illumination light beams, obtained from modulation upon each of the plural numbers of illumination light beams by a frequency, differing from each other, within each of plural numbers of modulators, upon a surface of an inspection target substrate, being deflected by an optical deflector into a direction about normal to a running direction of a scanning stage, in a form of plural numbers of illumination spots;

a detection step for condensing reflected/scattered lights, which are generated from said inspection target substrate due to scanning of the plural numbers of illumination spots irradiated in said illumination step, so as to form an image through an image-forming system, and receiving lights of the image of reflected/scattered lights due to the scanning of said plural numbers of image-formed illumination spots, upon a photo-detector, thereby converting it into a signal; and

a signal processing step for extracting components corresponding to the frequencies, with which frequency the modulation is made within each of said optical modulators within each of the plural numbers of synchronization detector circuits, from the signal converted by said photo-detector, and thereby detecting defects upon basis of the signal extracted therefrom.